In the Claims

Claim 1 (Previously presented): A genetically modified stem or progenitor cell comprising:

(a) a first exogenous polynucleotide comprising a gene switch/biosensor, wherein said gene switch/biosensor encodes a physiological stimulus-sensitive chimeric transactivator and an operatively linked promoter; and

(b) a second exogenous polynucleotide comprising a gene amplification system, wherein said gene amplification system comprises a nucleic acid sequence encoding a therapeutic product.

Claim 2 (Original): The cell of claim 1, wherein said gene amplification system further comprises a GAL4 upstream activating sequence (UAS) linked to said nucleic acid sequence encoding said therapeutic product.

Claim 3 (Previously presented): The cell of claim 1, wherein said chimeric transactivator is oxygen-sensitive.

Claim 4 (Original): The cell of claim 2, wherein said physiological stimulus is a signal associated with a pathological condition, and wherein said chimeric transactivator of said first exogenous polynucleotide binds to said GAL4 UAS of the second exogenous polynucleotide in response to the signal associated with the pathological condition, resulting in expression of the therapeutic nucleic acid sequence encoding the therapeutic product.

Claim 5 (Original): The cell of claim 4, wherein said signal is hypoxia associated with ischemia.

Claim 6 (Previously presented): The cell of claim 1, wherein said gene switch/biosensor encodes an oxygen-sensitive chimeric transactivator and an operatively linked promoter, wherein said oxygen-sensitive chimeric transactivator comprises a GAL4 DNA-binding domain (DBD), an

oxygen-dependent, and a p65 activation domain (p65AD); and wherein said nucleic acid sequence encoding a therapeutic product comprises a cardioprotective gene linked to a GAL4 upstream activating sequence (UAS).

Claim 7 (Previously presented): The cell of claim 6, wherein said therapeutic product is selected from the group consisting of heme oxygenase-1 (HO-1), superoxide dismutase, phospholanban (PLN) pre-pro-insulin, an anti-cell growth polypeptide, an anti-angiogenesis polypeptide, tPA, erythropoietin, a polypeptide with hypolipidemic activity, a polypeptide that acts on the cholesteryl ester transfer protein and lipase systems, a polypeptide that provides low density lipoprotein receptor replacement, a polypeptide that induces vascular protection and disobliteration of occlusions, and an interfering RNA molecule.

Claim 8 (Previously presented): The cell of claim 1, wherein said cell comprises a viral vector comprising said first and second exogenous polynucleotides.

Claim 9 (Original): The cell of claim 8, wherein said viral vector is selected from the group consisting of a adeno-associated virus, an adenovirus, and a retrovirus.

Claim 10 (Original): The cell of claim 8, wherein said viral vector is adeno-associated virus.

Claim 11 (Previously presented): The cell of claim 1, wherein said cell comprises a non-viral vector comprising said first and second exogenous polynucleotides.

Claim 12 (Previously presented): The cell of claim 1, wherein said cell is a pluripotent or totipotent stem cell.

Claim 13 (Previously presented): The cell of claim 1, wherein said cell is selected from the group consisting of a hematopoeitic stem cell, a mesenchymal stem cell (MSC), a muscle derived stem cell, and a bone marrow mesenchymal progenitor cell (MPC).

Claim 14 (Cancelled)

Claim 15 (Currently amended): The cell of claim 1, wherein said gene amplification system comprises nucleic acid sequences encoding multiple therapeutic products, wherein said therapeutic products are ~~the same or~~ different.

Claim 16 (Previously presented): The cell of claim 1, wherein said therapeutic product is a polypeptide that is heterologous to said cell.

Claim 17 (Previously presented): The cell of claim 1, wherein said therapeutic product is a polypeptide that is endogenous to said cell.

Claim 18 (Previously presented): The cell of claim 1, wherein said physiological stimulus is selected from the group consisting of hypoxia, glucose, a tumor marker, and an atherosclerosis indicator of inflammation.

Claim 19 (Previously presented): The cell of claim 1, wherein said physiological stimulus is selected from the group consisting of hypoxia, a cytokine, MCP-1, c-reactive protein, elevated triglyceride level, elevated oxidized LDL cholesterol level, elevated Lp(a) level, elevated homocysteine level, decreased HDL level, and decreased nitric oxide production.

Claim 20 (Withdrawn): The cell of claim 1, wherein said physiological stimulus-sensitive chimeric transactivator comprises a glucose-sensitive element, and wherein said therapeutic product comprises pre-pro-insulin.

Claims 21-27 (Cancelled)

Claim 28 (Previously presented): A modified mammalian tissue, wherein said tissue comprises a genetically modified mammalian stem or progenitor cell, wherein said cell comprises:

(a) a first exogenous polynucleotide comprising a gene switch/biosensor, wherein said gene switch/biosensor encodes a physiological stimulus-sensitive chimeric transactivator and an operatively linked promoter; and

(b) a second exogenous polynucleotide comprising a gene amplification system, wherein said gene amplification system comprises a nucleic acid sequence encoding a therapeutic product.

Claim 29 (Previously presented): The tissue of claim 28, wherein said tissue is human tissue and said cell is a human cell.

Claim 30 (Previously presented): The tissue of claim 28, wherein said cell is autologous to said tissue.

Claim 31 (Previously presented): The tissue of claim 28, wherein said tissue is myocardium, mesenchymal tissue, pancreatic tissue, liver tissue, or brain tissue.

Claim 32 (Previously presented): The tissue of claim 28, wherein said therapeutic product is heme oxygenase-1 (HO-1), superoxide dismutase, phospholanban (PLN) pre-pro-insulin, an anti-cell growth polypeptide, an anti-angiogenesis polypeptide, tPA, erythropoietin, a polypeptide with hypolipidemic activity, a polypeptide that acts on the cholesteryl ester transfer protein and lipase systems, a polypeptide that provides low density lipoprotein receptor replacement, a polypeptide that induces vascular protection and disobliteration of occlusions, or an interfering RNA molecule.

Claim 33 (Previously presented): The tissue of claim 28, wherein said physiological stimulus is hypoxia, a cytokine, MCP-1, c-reactive protein, elevated triglyceride level, elevated oxidized LDL cholesterol level, elevated Lp(a) level, elevated homocysteine level, decreased HDL level, or decreased nitric oxide production.

Claim 34 (Previously presented): The tissue of claim 28, wherein said cell is a hematopoeitic stem cell, a mesenchymal stem cell (MSC), a muscle derived stem cell, or a bone marrow mesenchymal progenitor cell (MPC).